Influence of the familiarity with the handler on the dog's paw preference

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Abstract: The term laterality refers to the preference most mammals show for one body side over the other. The aim of this study was to evaluate the reproducibility of the First-stepping test (Tomkins et al., 2010b) in relation to the familiarity with the handler. Thirty-eight adult dogs (22 females, 16 males, different breeds) were tested twice in a modified version of Tomkins' test (30 repetitions instead of 50), once with the owner and once with an unfamiliar handler, one day apart.

The paw preference (PP) for each dog in both tests was determined as suggested by Tomkins et al. (2010), calculating the lateralization index and considering a significant preference for Z-scores < – 1.96 (left PP) or > + 1.96 (right PP).

There was a low concordance between the Z-scores of the two tests (Cohens' Kappa coefficient = 0.44). In detail, the Z-score of 14 dogs was different in relation to the familiarity with the handler: 1 dog showed a right PP with the owner and a left PP with the unfamiliar handler; 9 dogs showed a non-significant Z-score with the owner and a significant Z-score with the unfamiliar handler; 4 dogs showed a significant Z-score with the owner and a non-significant Z-score with the unfamiliar handler.

Previous literature on dogs and other mammals reports that laterality is strongly task-dependent. The current findings suggest that PP may be influenced by other factors, such as the familiarity with the handler, which should be taken into account when testing animals for motor laterality.

Key Words: dog, familiarity, first-stepping test, handler, laterality.

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Introduction

The term laterality refers to the preference most mammals show for one side of their body over the other. More specifically, motor lateralization is "an observable measure of cerebral functional asymmetry" (Wells, 2003). Lateralised functional activity of the cerebral hemispheres can be identified by recording patterns of behaviour that show a side bias (Rogers & Andrew, 2002), for example by observing the limb preferentially used by an animal during a motor task (Bisazza et al., 1998; Rogers, 2002; Rogers & Andrew, 2002).

Several studies tried to demonstrate a correlation between behaviour and lateralization in different species (Deckel, 1995; Cameron and Rogers, 1999; Westergaard et al., 2002). Only lately, though, motor lateralization has been taken into account as a possible parameter for predicting specific behavioural patterns regarding dogs (Branson et al., 2003; Branson and Rogers, 2006). The possibility of predicting behavioural responses thanks to the strength of motor lateralization (LI = [R-L]/[R+L] x 100), along with other predictors, might help to avoid possible stress inflicted on animals by behavioural tests (Batt et al., 2009).

Branson & Rogers (2006) found that dogs with a weaker paw preference were more prone to distress in response to loud noise. Another example of correlation between behavior and lateralization

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is shown in the studies of Quaranta and colleagues (2007), who demonstrated how a positive or negative stimulus could influence the tendency of a dog to wag its tail to the right or to the left.

In dogs, lateralization is commonly identified by observing the paw used during tasks that challenge them to remove a piece of tape placed over their eyes (Tan, 1987; Tomkins et al., 2010a) or nose (Quaranta et al., 2004; Quaranta et al., 2006), to remove a blanket from over their head, to "shake hands", and to retrieve food from a can (Wells, 2003) or from a Kong toy (Branson and Rogers, 2006).

From the studies examined it shows that lateralized behavior in the domestic dog is strongly task-dependent and it may also be influenced by other factors.

The aim of this study was to evaluate the reproducibility of the First-stepping test (Tomkins et al., 2010b) in dogs when handled by a familiar or by an unfamiliar person.

Subjects, materials and methods

Thirty-eight dogs (16 males and 22 females, 5.3±3.1 years old, belonging to different breeds) were tested twice in a modified version of the Tomkins' test, once with the owner and once with an unfamiliar handler.

This test was performed on an enclosed staircase with three 16-cm steps. The handler stood next to the dog on the upper level of the staircase, held the dog on a loose leash, and started the test when the dog was calm. When the dog's forelegs were level, the researcher called the dog to come.

The test consisted in assessing which paw was lifted first by the dog from a standing position and then used by the dog to go down the stairs.

For each dog, the test was repeated 30 times (instead of 50, as reported in Tomkins et al., 2010b) with a familiar handler, i.e. the owner, and 30 times with an unfamiliar handler. For each handler, 15 repetitions were recorded while the handler was on the right side of the dog (Fig. 1) and 15 while the handler was on the left side of the dog (Fig. 2).

The researcher stood facing the pair, roughly 2 meters from the staircase, and each test was recorded with a fixed camera placed 2 meters from the staircase, in case that a retrospective determination of the paw used had been needed.

The paw preference (PP) for each dog in both tests was determined calculating the lateralization index (LI) and considering a significant preference for Z-scores (z) < -1.96 or $> +1.96$, as suggested by McGreevy et al. (2010) and Tomkins et al. (2010 a, b).

Cohens' Kappa coefficient was used to calculate the concordance between PP of each dog when handled by the owner and by an unfamiliar person.

Fig. 1. Handler standing on the right side of the dog before starting the test and during the test; this dog shows the use of the left paw to go down the first step.

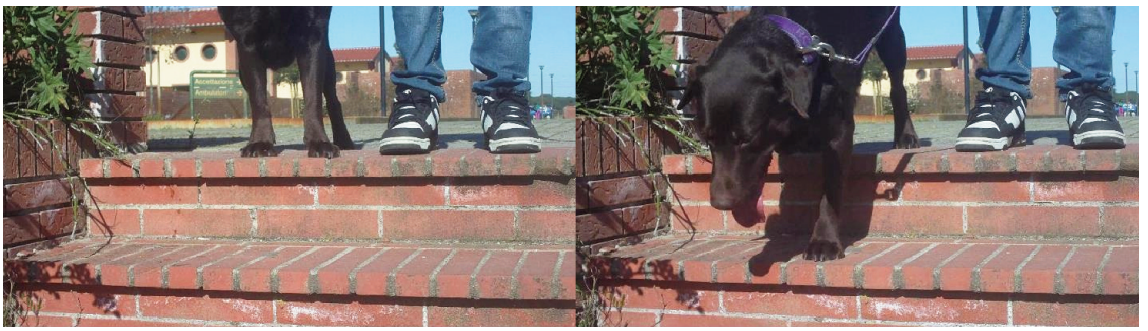

Fig. 2. Handler standing on the left side of the dog before starting the test and during the test; this dog shows the use of the left paw to go down the first step.

Results

The distribution of paw preferences based on the three categories (right-preferent, left-preferent, or ambidextrous), with the owner and with the unfamiliar handler, is shown in Fig. 3.

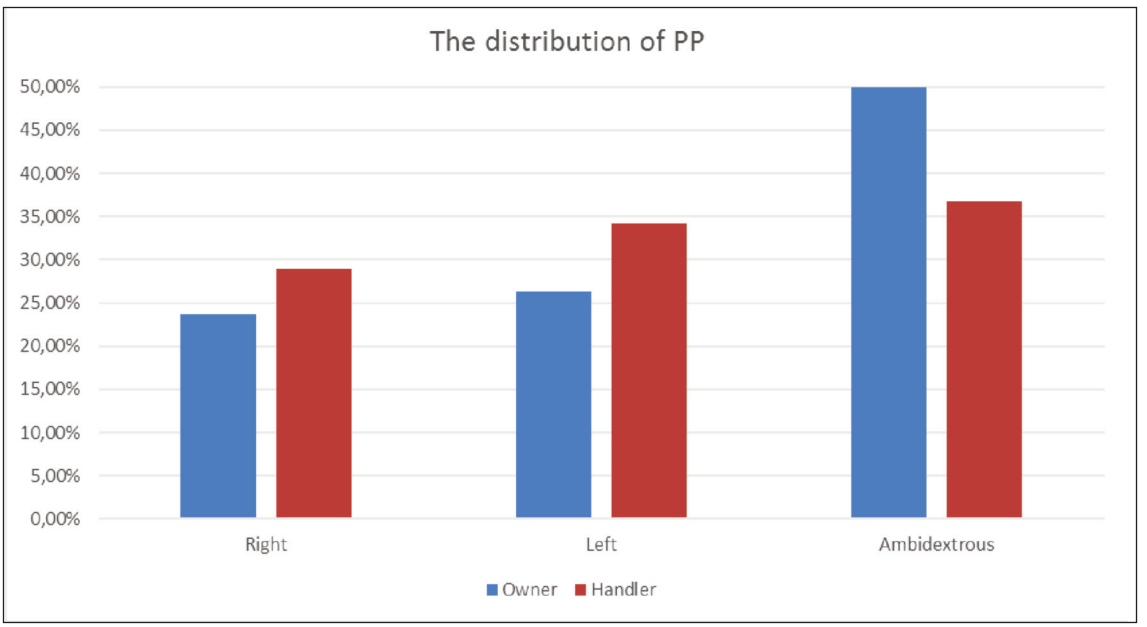

Fig. 3. Distribution of dog paw preference based on the three paw categories: right-preferent, left-preferent, or ambidextrous.

The Z-score of 14 dogs differed according to the familiarity of the dog with the handler (Fig. 4): 1 dog showed a right PP with the owner and a left PP with the unfamiliar handler; 9 dogs showed a non-significant Z-score with the owner and a significant Z-score with the unfamiliar handler; 4 dogs showed a significant Z-score with the owner and a non-significant Z-score with the unfamiliar handler.

The lateralization indexes of the two test series, with the familiar and unfamiliar handler, were found to have a low concordance (Cohens' Kappa coefficient = 0.44). Sex differences are shown in Fig. 5: there was no association between measures of laterality and sex effect ($p=0.225$ with the owner and $p=0.218$ with the handler).

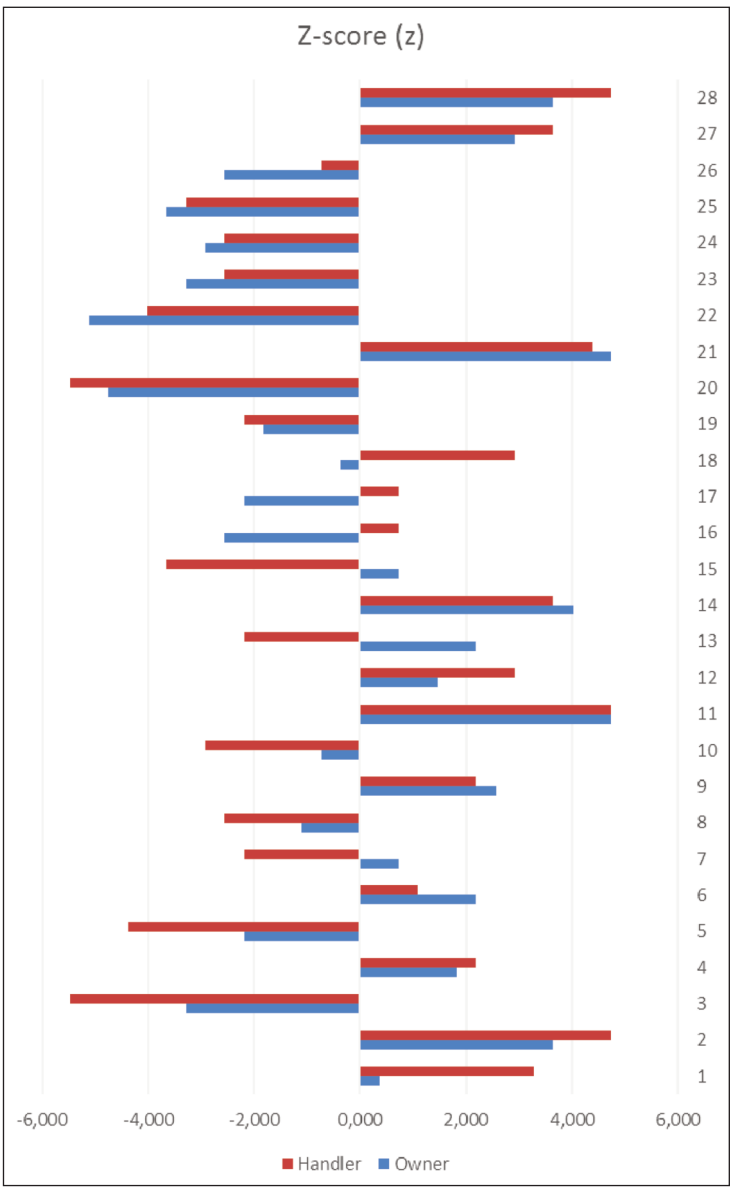

Figure 4. Z-score with the owner and with the unfamiliar handler.

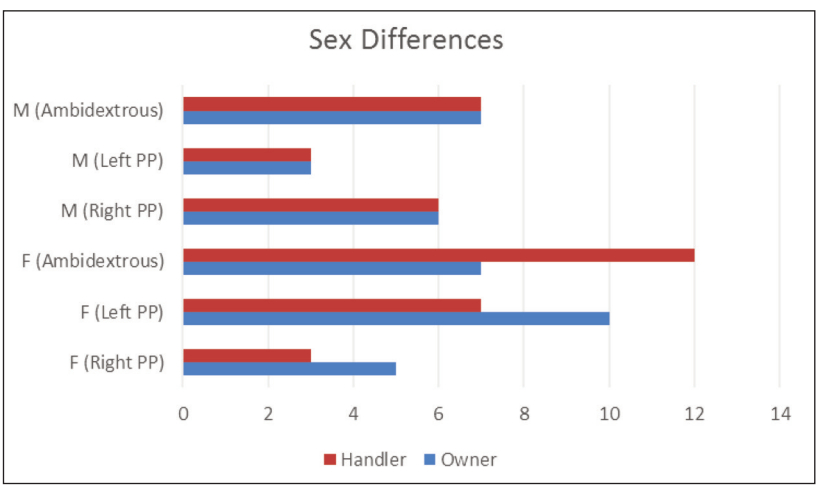

Figure 5. Sex differences (16 males and 22 females).

Discussion

This First-stepping Test differed from Tomkins' Test only for the number of repetition (30 instead of 50). This choice was adopted to control stress levels because many dogs were beginning to show nervousness at around 25 repetitions. It is safe to assume that stress level might influence the subject's spontaneity and its preference for one paw or the other. Therefore, before testing the subjects, they should be acclimated to the test for a short period or, like in this case, the number of repetitions should be lowered.

As stated before, and according to many studies in primates and dogs, the PP changes with task complexity (Fagot & Vauclair, 1991; Spinozzi & Truppa, 1999; Trouillard & Blois-Heulin, 2005; Wells, 2003; Batt et al., 2008a; Tomkins et al., 2010b) and, probably, in this study it was not possible to verify the PP whit a different test.

In addition to the correlation with the specific activity, some authors state that male dogs show a preference for the left paw while female dogs show it for the right paw (Wells, 2002 and 2003; Quaranta et al., 2004 and 2006). However, in this study (Fig. 5) and in others (Tan and Caliskan, 1987; Van Alphen et al., 2005; Branson & Rogers, 2006; Poyser et al., 2006; Batt et al., 2008a; Tomkins et al., 2010b) there was no association between measures of laterality and sex effect but the results could also be affected by the sterilization (in this study only 4 subjects were sterilized, 3 female and 1 male).

In conclusion, the current findings suggest that in dogs the paw preference, besides being task-dependent, may be influenced by other factors, such as the familiarity with the handler. Therefore, this factor should be taken into account when testing animals for laterality.

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Influenza della familiarità col conduttore sulla preferenza di zampa nel cane

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Sintesi

Il termine lateralizzazione si riferisce alla preferenza che la maggior parte dei mammiferi mostra per un lato del corpo rispetto all'altro.

Lo scopo di questa ricerca è stato quello di valutare la riproducibilità del First-stepping test in relazione con la familiarità con il conduttore.

Per la ricerca sono stati utilizzati 38 cani, di cui 22 femmine, di differenti razze che sono stati sottoposti ad una versione modificata del test di Tomkins (30 ripetizioni invece di 50), sia col proprietario sia con un conduttore no conosciuto, in due differenti giornate.

La preferenza di zampa per ogni cane è stata determinata calcolando l'indice di lateralizzazione e considerando significativa una preferenza della zampa sinistra quando lo score Z era inferiore a -1,96 e una preferenza per la zampa destra quando era superiore a +1,96.

C'era una bassa concordanza tra gli Z score dei due test (coefficiente K di Cohen = 0,44).

Nel dettaglio, gli Z score di 14 cani erano differenti in relazione alla familiarità con il conduttore; 1 cane mostrava una preferenza per la zampa destra con il proprietario e per la zampa sinistra con il conduttore; 9 cani mostravano uno Z score non significativo, con il proprietario ed uno significativo con il conduttore; 4 cani mostravano uno Z score significativo con il proprietario e non significativo con il conduttore.

Le precedenti ricerche effettuate sul cane ed altri mammiferi riportano come la lateralizzazione sia fortemente dipendente dalla prova. I risultati di questa ricercar suggeriscono che la preferenza per una zampa può essere influenzata anche da altri fattori, come ad esempio la familiarità con il conduttore, fattore che dovrebbe essere tenuto in considerazione quando si testa un animale per valutare una lateralizzazione motoria.